# Seeing or believing? Cross-listing and the earnings response

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## Abstract

**Purpose** – The purpose of this paper is to identify and examine two contrasting mechanisms of information asymmetry for cross-listed firms with respect to the information environment and its impact on earnings response.
**Design/methodology/approach** – The study empirically assesses two mechanisms of information asymmetry ("seeing" and/or "believing") by looking at abnormal returns and volume reactions to international firms' earnings announcements pre- and post-listing in the USA from 1990 to 2012.
**Findings** – The authors' findings indicate that investors "seeing" more (media and analyst coverage) decrease the earnings response; however, "believing" more or gaining more credibility has the opposite effects. Based on the results, both mechanisms of information asymmetry can take effect simultaneously.
**Research limitations/implications** – The study sheds light on the multi-dimensional impact of the improved information environment that non-US firms face when they list their securities on US exchanges.
**Originality/value** – This study identifies and reconciles these two mechanisms of information asymmetry (visibility and credibility) under one setting and estimates the magnitude of each effect empirically.

**Keywords** Corporate governance, Information asymmetry, Earnings response, International cross-listing
**Paper type** Research paper

## Introduction

The last 20 years witnessed a surge in cross-listings across markets. Until now, there have been more than 1,800 non-US firms listed in the USA. For the foreign companies listed in the USA, it is believed that cross-listing helped foreign firms overcome market segmentation, provided them with greater liquidity, lowered capital costs and improved investor protection (Roosenboom and van Dijk, 2009).

More interestingly, such cross-listings may also significantly change the information environment and the way investors interpret the disclosed information (Karolyi, 2012; Charitou *et al.*, 2007; La Porta *et al.*, 1997, 1998, 2000). Although it is well documented that cross-listed firms may provide investors with more analyst coverage and more credible disclosures, the effect of an improved information environment on the earnings response is not *a priori* obvious.

The traditional wisdom is that the abnormal absolute price movement and trading volume around the earnings announcements should be lower after a firm cross-lists in the USA. The intuition is that earnings announcement reactions (e.g. abnormal trading volume/return) reflect differences among individual investors in the price formation process (Diamond and Verrecchia, 1991; Kim and Verrecchia, 1994). Increased analyst and media coverage disseminate more pre-announcement information among investors, generating less noise and lower residual uncertainty (Bailey *et al.*, 2006). These will diminish volatility and volume reactions to earnings announcements upon cross-listing.

In the title of our paper, we ask "seeing or believing" with respect to the two mechanisms of information asymmetry that we attempt to identify in this paper. With reference to the question on "seeing or believing," here (investors) "seeing" more disclosure and transparency due to increased analyst and media coverage helps improve the cross-listed firm's visibility. Here, the "seeing" mechanism describes the path of traditional wisdom in the finance literature. As per this first mechanism, we can expect that a decrease in residual

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information will lead to a decrease in trading volume and abnormal returns (AR) on earnings per share (EPS) announcements (Bailey *et al.*, 2006).

However, we can argue that "seeing" may not translate to "believing" or imply improved credibility for the cross-listed firm. The second mechanism of information asymmetry addresses this distinction between seeing and/or believing. We argue that this level of information asymmetry is the discrepancy that may exist between announced earning numbers by firm insiders and the true value perceived by investors. The basic assumption of this second mechanism of information asymmetry is that investors' reaction to earnings surprise is based on the credibility or believability of the earnings report; at one extreme, investors may hardly react to the earnings numbers from foreign firms coming from weak accounting environments, deeming them to be untrustworthy. Thus, as per this second mechanism, cross-listed firms bonding to more stringent disclosure requirements and a higher standard of corporate governance imposed by American regulators, as per the generally accepted accounting principles (GAAP), will lead to increased credibility for the cross-listed firm and benefit the information environment. We expect that the second mechanism of information asymmetry, with increased credibility of the disclosed information by the cross-listed firms, will result in an increase in trading volume and AR on EPS Announcements – contrary to the outcome we expect for the first mechanism of information asymmetry. Several papers (Holthausen and Verrecchia, 1988; Teoh and Wong, 1993; Bailey *et al.*, 2006) argue in support of this contrasting impact as they note that international firms cross-listing in the USA can expect more volatility and volume reactions upon cross-listing than non-cross-listed firms.

These two contradictory effects of cross-listing on the information environment highlighted by the two mechanisms of information asymmetry above raise an interesting theoretical and empirical puzzle which has not been identified and explored previously in the corporate governance and finance literature. In this paper, we argue that both mechanisms of information asymmetry can take effect simultaneously if an international firm chooses to list its shares in the USA. We reconcile these two mechanisms under one setting and estimate the magnitude of each effect empirically.

## Cross-listing and the earnings response

With respect to information asymmetry associated with the information environment following an international firm cross-listing in the USA, two types of information asymmetry are particularly vital in this setting: visibility ("seeing") and credibility ("believing").

### *Visibility*

Diamond and Verrecchia (1991) argue that different price formation processes, arising from information asymmetries among individual investors, lead to trading volume reactions. The logic here is that earnings announcements can be linked with information asymmetry of investors, i.e. when new information (such as earnings announcements) is available, investors with more precise and accurate private information (indicating less information asymmetry) will make "smaller revisions to the expected value of the stock" than less informed individual investors with less precise information, indicating higher information asymmetry (Bailey *et al.*, 2006, p. 6). One can expect lower changes in trading volume and volatility reactions to earnings announcements after international firms cross-list in the USA: "If, for example, we find that the reactions diminish upon listing, one could infer that the pre-announcement information among investors is now of higher quality, generating less noise and lower residual uncertainty" (Bailey *et al.*, 2006, p. 7).

Thus, as per the bonding hypothesis, foreign firms benefitting from improved disclosure and transparency with increased analyst and media coverage that disseminate more pre-announcement information among individual investors would generate less noise and

lower residual uncertainty and diminishing volatility and volume reactions to earnings announcements upon cross-listing.

Based on the reasoning above, we can also argue that for international firms that do not have adequate analyst and media coverage in their home country cross-listing in the USA would lead to more significant reduction in information asymmetry among informed and uninformed investors – indicated by lower AR and lower trading volume to earnings announcements upon cross-listing – compared to firms that have adequate analyst and media coverage.

*Credibility*

In contrast to the information asymmetry mechanism discussed in the prior section, another stream of literature in accounting questions the predictions of the bonding hypothesis and the impact of cross-listing on the earnings response. One of the seminal papers in this second stream of literature is Holthausen and Verrecchia (1988), which develops a model that predicts that market reactions of an earnings surprise will increase doubts with respect to the perceived credibility of the earnings report. The model developed by Holthausen and Verrecchia (1988) examines the information asymmetry that lies in the discrepancy between announced earnings numbers by firm insiders and the true value perceived by individual investors. The basic assumption of the Holthausen and Verrecchia (1988) model is that investors' reaction to earnings surprise is based on the credibility of the earnings report. Thus, at one extreme, investors may hardly react to the earnings numbers from foreign firms coming from weak institutional environments, deeming them to be untrustworthy. Motivated by prevalent window dressing and creative accounting activities in practice by some firms, studies in accounting question whether the market reaction to earnings surprises is associated with the perceived quality of the reported earnings numbers.

The study by Teoh and Wong (1993) finds empirical support for the arguments made by Holthausen and Verrecchia (1988) with their findings that earnings responses coefficient (ERC) of international firms with more credible reports (i.e. with high-quality auditors, conformance of the financial report with GAAP and less discretion in the management of accruals) are statistically higher than firms with unreliable disclosures.

Thus, based on this second stream of literature in accounting with the arguments and findings made by Holthausen and Verrecchia (1988), Teoh and Wong (1993) and Bailey *et al.* (2006), we argue that for international firms cross-listing in the USA with more stringent disclosure requirements and a higher standard of accounting credibility, the level of believability will increase. This will be followed by higher AR and higher trading volume to earnings announcements upon cross-listing.

In this paper, we argue that both mechanisms of information asymmetry ("seeing" and "believing") can take effect simultaneously if an international firm chooses to list its shares in the USA. Bae *et al.* (2006) find evidence that cross-listing events increase firm-specific information, analyst coverage and decrease earnings management activities. Increased analyst and media coverage ease the process of information acquisition, lower the cost information dissemination and, thus, improve information symmetry among investors. Additionally, more stringent disclosure requirements and a higher standard of corporate governance imposed by American regulators build up the credibility of the disclosed information.

## Theoretical model

A parsimonious model illustrates the mechanisms. Denote the pre-announcement market expectation of earnings by $V^e$, and the announced earnings number by $V$. For simplicity, assume individual investors' private beliefs are distributed uniformly on the interval $[V^e-\varepsilon, V^e+\varepsilon]$. Hence, $\varepsilon$ measures the degree of information asymmetry result from lack of

visibility ("seeing" channel). Similarly, assume the true value of earnings is distributed on $[V - \delta, V + \delta]$ with a cumulative distribution function $F(\cdot)$. Consequently, $\delta$ and $F(\cdot)$ determine the credibility of the announced information ("believing" channel). Further assume non-risk-seeking investors are represented by a von Neumann Morgenstern utility function $u(\cdot)$, and individuals incur a fixed cost $c$ of trading securities. In equilibrium, the investor $x$ who is indifferent between trading and not trading after the announcement of a positive earnings surprise is given by:

$$\int_{-\delta}^{\delta} u(V+y-x)dF(y) = c,$$

As Figure 1 illustrates, the number of investors revising their holdings is $x + \varepsilon - V^e$. This implies that as $\varepsilon$ diminishes, information asymmetry due to the lack of visibility becomes less severe, and fewer investors trade. For traceability, further assume the representative agent with a linear utility function, and $F(\cdot)$ follows a normal distribution with a mean of 0 and standard deviation of $\sigma$. Here, $\sigma$ measure the credibility of the earnings announcement. Our equilibrium condition can be written as:

$$\frac{V-x}{\sigma} = c.$$

Obviously, holding others constant, as credibility improves ($\sigma$ decreases), the number of investors revising their holdings ($x+\varepsilon-V^e$) will be larger. This leads to our first results:

*Lemma 1.* *Ceteris paribus*, a higher level of visibility should lead to smaller ERCs.

Additionally, the equation above implies that as distribution $F(\cdot)$ becomes less spread out, earnings announcements become more credible, $x$ rises and, in turn, expected trading activities augment. This leads to our second result:

*Lemma 2.* *Ceteris paribus*, a higher level of credibility should lead to larger ERCs.

## Empirical methods

### *Identification strategy*

The main challenge of our empirical investigation is to reconcile and differentiate the two mechanisms – "seeing" or "believing." The key ingredients are two unique institutional facts in our cross-listing sample.

First, Canadian cross-listings provide an experiment to test the visibility channel ("seeing") in a clean setting. Firms from Canada can cross-list directly in the US markets and file the disclosures under Canadian GAAP which is comparable to US GAAP as permitted by the Multi-Jurisdictional Disclosure System since 1991. For the Canadian cross-listings, the abnormal return and trading volume around the earnings announcements are ideally the outcomes of enhanced visibility, free of the effects of change in reporting standards and accounting credibility. In other words, the "believing" channel is ineffective for Canadian firms by construction, leaving us with a clean identification of the "seeing" channel.

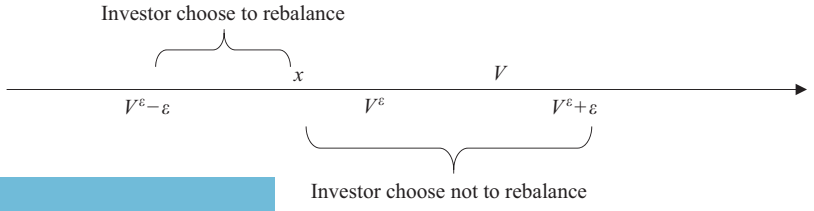


**Figure 1.**
Model equilibrium

Second, the listing requirements in the USA provide additional quasi-experiments for identifying the credibility channel ("believing"). In the USA, shares of foreign firms can be traded over-the-counter (OTC) on the OTC Bulletin Board or as a pink sheet issue, with minimal Securities and Exchange Commission (SEC) disclosure and no GAAP reconciliation requirements. This is known as a Level I American Depository Receipts (ADRs). However, Level II and III ADRs, usually listed in exchanges, must comply with US GAAP and full SEC disclosure requirements. Lastly, SEC Rule 144a issues, which are not obligated to conform to GAAP, allow firms to raise capital as private placements to qualified institutional buyers. As a result, *ceteris paribus*, for shares registered under Level II and III ADRs, we should expect a larger change in AR and trading volume around earnings announcements than for companies that choose the Level I or Rule 144a registration.

*Data and sample*

This study assesses the effects of cross-listings on the information environment through an event study approach. Our data sample includes 1,313 non-US firms listed in the USA between January 1990 and December 2011 from 46 emerging and developed markets. We exclude the listings before 1990 because the coverage of international firms in the Compustat Global database is sparse. The foreign listing sample comes from several sources and excludes countries that were classified as tax havens. The countries classified as tax havens include the Bahamas, Bermuda, the Cayman Islands, Jersey, the Netherlands Antilles and Panama. We collect data on ADRs from four major commercial banks that provide depositary bank services: BNY Mellon, J.P. Morgan, Citi and Deutsche Bank. In addition, we collect direct foreign listings information of Canadian and Israeli companies from individual US stock exchanges. The firms included in the sample satisfy the following criteria: first, each foreign listing should correspond to an identifiable underlying security traded in the home market – i.e. daily closing prices and trading volumes from the home market are available. Second, the first three ADRs in each country are excluded to minimize the possible influences from market liberalization. Finally, firms must have a minimum of five analyst forecasts and earnings announcements to be part of the sample.

Table I shows the number of non-US firms listing in the USA as ADRs, classified by the country of origin and the type of business. Notably, the sample size is considerably larger than previous studies because of the cross-listing waves since 2004.

For each stock, data for the daily home market returns (in US$) and trading volume have been collected from Compustat Global and Datastream. Data with respect to earnings announcement dates, values, number of analysts following the stocks and analyst earnings forecasts have been obtained from the Institutional Brokers Estimate System. In addition, we use the US three-month *T*-bill rate from CRSP as the proxy for the risk-free rate. This study excludes preferred stocks, REITs, closed-end funds and other non-common stocks from our sample.

*Variables*

Event studies measure the effects of an economic event on the characteristics of a security. In this section, we conduct an event study to examine the abnormal security returns or trading volume after or before an event. Our goal in this section is to best specify, test and interpret the reaction of cross-listings toward earnings response over the period of 1990–2014. The earnings announcements sample extend beyond December 2011 because we can examine the earnings response both before and after cross-listing events. Through this event study, we also investigate through which channels these reactions happen.

*Abnormal return and trading volume*

First, we compute the ERC through a short event window using daily return data around quarterly earnings announcements. We estimate the ERC of our mentioned security's abnormal

| | 1991–2000 | 2000–2011 | Total | | 1991–2000 | 2000–2011 | Total |
|---|---|---|---|---|---|---|---|
| *Developed markets* | | | | *Emerging markets* | | | |
| Australia | 16 | 12 | 28 | Argentina | 16 | 4 | 20 |
| Austria | 1 | | 1 | Brazil | 6 | 9 | 15 |
| Belgium | 4 | 2 | 6 | Chile | 26 | 3 | 29 |
| Canada | 292 | 168 | 460 | China | 15 | 14 | 29 |
| Denmark | 5 | 1 | 6 | Colombia | 1 | 1 | 2 |
| Finland | 5 | 1 | 6 | Dominican | 1 | | 1 |
| France | 31 | 9 | 40 | Ghana | 1 | | 1 |
| Germany | 25 | 9 | 34 | Hungary | 1 | | 1 |
| Greece | 4 | 3 | 7 | India | 8 | 8 | 16 |
| Hong Kong | 11 | 5 | 16 | Indonesia | 5 | | 5 |
| Iceland | 1 | | 1 | Israel | 98 | 29 | 127 |
| Ireland | 24 | 8 | 32 | Jordan | 1 | | 1 |
| Italy | 12 | 2 | 14 | Mexico | 40 | 10 | 50 |
| Japan | 9 | 8 | 17 | Peru | 3 | | 3 |
| Luxembourg | 14 | 8 | 22 | Philippines | 2 | 1 | 3 |
| The Netherlands | 43 | 16 | 59 | Poland | 1 | | 1 |
| New Zealand | 10 | 2 | 12 | Russia | 5 | 4 | 9 |
| Norway | 10 | 2 | 12 | South Africa | 8 | 2 | 10 |
| Portugal | 3 | | 3 | South Korea | 9 | 8 | 17 |
| Singapore | 7 | 2 | 9 | Taiwan | 6 | 2 | 8 |
| Spain | 4 | 4 | 8 | Turkey | 1 | | 1 |
| Sweden | 16 | 2 | 18 | Venezuela | 4 | | 4 |
| Switzerland | 13 | 7 | 20 | | | | |
| UK | 101 | 28 | 129 | Total | | | 1,313 |

**Table I.**
Distribution of cross-listings in the USA across countries and time

**Notes:** This table provides the distribution of foreign firms cross-listed in the USA during the 1990–2011 period. It shows the distribution of cross-listings across countries and time
**Source:** The foreign listing data come from several sources: Citigroup ADR databases, Sarkissian and Schill (2004) public data set and CRSP

return and trading volume over a four-day period [−2, +2]. Using these narrow windows helps us control for time clustering of events and reduces contamination problems[1].

To capture the dynamics of asset returns in an international context, we use the international CAPM (ICAPM) to calculate the AR:

$$R_{i,t} = \alpha_i + \beta_i R_{w,t} + \gamma R_{c,t} + \varepsilon_{i,t},$$

where $R_{w,t}$ is MSCI All Country World Index return, $R_{c,t}$ is the MSCI country index return for the home market of firm $i$ and $R_{i,t}$ is the excess stock return for firm $i$. Given the ICAPM parameter estimates, we then measure and analyze the AR from the residuals for the event window $[t_1, t_2]$ around the event. In this study, we run the ICAPM model using data from a 252-trading day estimation period:

$$R_{i,t} = R_{i,t} - \widehat{\alpha}_i - \widehat{\beta}_i R_{w,t} - \widehat{\gamma}_i R_{c,t}.$$

To draw overall inferences for the event of interest, the abnormal return observations must be cumulative. We obtain cumulative abnormal returns for different sub-periods $[t_1, t_2]$ during an event window as follows:

$$\mathrm{CAR}_i^{[t_1,t_2]} = \sum_{i=t_1}^{t_2} AR_{i,t}.$$

The event study methodology also requires estimating the abnormal trading volume around the event dates of earnings announcements. Consequently, we must define the concept of "normal" state of trading volume, i.e. control volume. Following Abad Romero *et al.* (2013), the level of control trading volume for firm $i$ ($CV_i$) is estimated as the moving average of the market trading volume on that firm $i$ in the period of two months (44 trading days) before the announcement. Formally, this study defines the control liquidity as:

$$\mathrm{CV}_i = \frac{1}{20}\sum_{t=-44}^{-22} VOLUME_{i,t}.$$

This control trading volume for asset $i$ should be compared with the volume around the date when the earnings announcement is made. For this, event trading volume is calculated as the mean trading volume in a window $[t_1, t_2]$ around the announcement:

$$\mathrm{EV}_i = \frac{1}{T}\sum_{i=t_1}^{t_2} VOLUME_{i,t}.$$

Finally, abnormal trading volume $AV_{i,t}$ is defined as:

$$AV_i = EV_i - CV_i.$$

*Earnings surprise*. When a company reports quarterly or annual profits, the actual value can be above or below analysts' expectations. The variable earnings surprise measures the difference, expressed as a percent, between the actual (reported) EPS and the average EPS estimate reported in the Institutional Brokers' Estimate System. It measures the accuracy of the analysts' forecast.

*Analysts forecast dispersion*. The dispersion is computed as the standard deviation of EPS forecasts divided by the absolute value of the mean EPS forecast. It measures the disagreement between the analysts' forecast of future profitability.

*Visibility*. A covered stock that is monitored or covered by an analyst at a brokerage firm for the purpose of issuing research reports that are disseminated to the firm's clients. The number of analysts covering the firm's stock measures the visibility of a firm's stock.

*Legal system*. La Porta *et al.* (1998) argue that the legal quality and other legal system characteristics may be one reason that foreign firms seek a US listing or investors value such a listing (Coffee, 1999; Stulz, 1999; Reese and Weisbach, 2002). In this study, we include a dummy variable, which equals 1 if a firm's home country follows the common law system and 0 otherwise, to detect such effects. Here we argue that countries that adopt the common law system have better protection for investors and higher corporate governance than countries that adopt the civil law system. The study by La Porta *et al.* (2000, p. 8) notes that "common law countries have the strongest protection of outside investors – both shareholders and creditors – whereas French civil law countries have the weakest protection." The information about the legal system is coming from the Central Intelligence Agency (2013).

*Accounting standards*. Foreign listings in the US markets could potentially change the cost of capital through an improvement of the firm's information environment. Firms can use a cross-listing on markets with stringent disclosure requirements to signal their quality to outside investors and to provide improved information by adopting strict accounting standards such as US GAAP and International Financial Reporting Standards (IFRS). Since the change in information environment upon listing in the US depends on the home country's prevalent accounting standard of the listing company, we include a dummy variable capturing such characteristics. The dummy variable equals one if the firm is required to follow IFRS or US GAAP and zero otherwise. The accounting standard

information is collected from various sources during June and July 2014 regarding the use of or conversion plans to IFRS provided by PricewaterhouseCoopers. The summary statistics are shown in Table II.

*Firm age*. Firm age is defined as the observation year minus the year of cross-listing. Firms that have been cross-listed for a long period of time might be perceived as more credible compared to younger firms. Therefore, we include the firm age as a control in our analysis.

## Results

### *Earnings response of Canadian firms before and after cross-listings*

In our regression analysis, we use the abnormal return and trading volume as the dependent variables which are regressed on a set of independent variables. The abnormal return and trading volume are in absolute terms. The panel data regression models are performed through fixed effect models (industry-fixed effects). The standard errors of the coefficients are clustered at the firm level.

Table III examines the earnings response of Canadian firms before and after cross-listing in the USA. To estimate the causal impact of the visibility channel, we construct two samples – a treatment group and a placebo group. The treatment group is the sample of Canadian firms which list their shares in US exchanges, and the placebo group (the control group) is a list of matched Canadian firms without cross-listings in the USA. The matching procedure, based on the firms' characteristics, follows the Euclidean distance-based sampling method. Each year, we implement the matching procedure as follows: first, we collect the firms' characteristics of our cross-listed firms at the end of the year (B/M ratio, market capitalization, leverage, analyst coverage and ERC[2]). We also collect the same variables for all the other listings in the Toronto Stock Exchange and standardize all characteristics' variables to zero mean and unit variance. Then, we compute the Euclidean distance between each pair of cross-listed and non-cross-listed firm using standardized firm characteristics. Mathematically, the Euclidean distance $d(x, y)$ is given as:

$$d(x,y) = \sqrt[5]{(BM_c - BM_{nc})^2 + (MC_c - MC_{nc})^2 + (Lev_c - Lev_{nc})^2 + (AC_c - AC_{nc})^2 + (ERC_c - ERC_{nc})^2},$$

| | Earning surprise | Abnormal return (%) | Abnormal trading volume (log) | Number of estimates | Dispersion of estimation | Legal system | Accounting standard |
|---|---|---|---|---|---|---|---|
| Mean | −0.245 | 0.04 | −0.046 | 4.388 | 0.666 | 0.682 | 0.923 |
| SD | 125.623 | 3.946 | 1.134 | 3.582 | 1.153 | 0.465 | 0.264 |
| P25 | 0.02 | −0.015 | −0.404 | 1.87 | 0.13 | 0 | 1 |
| P75 | 0.595 | 0.015 | 0.438 | 5.82 | 0.817 | 1 | 1 |
| Obs | 533,478 | 532,443 | 532,497 | 533,693 | 499,648 | 533,693 | 533,693 |

**Notes:** This table reports the summary statistics of abnormal return, volume and earnings estimates characteristics for foreign firms listed in the USA. The sample period is 1990–2013. All the stock returns and trading volume information are computed from CRSP daily stock data set. The earnings estimation information are retrieved from I/B/E/S database. The information of legal system and accounting standard are from CIA World Factbook and PricewaterhouseCoopers LLP. The abnormal return and trading volume are computed over a 4-day period [−2, +2]. The variable of earning surprise measures the difference, expressed as a percent, between the actual (reported) earnings per share (EPS) and the average EPS estimate reported in the Institutional Brokers' Estimate System. The dispersion is computed as the standard deviation of EPS forecasts divided by the absolute value of the mean EPS forecast. The legal system dummy equals to 1 if a firm's home country follows the common law system and 0 otherwise. The dummy variable of accounting standard equals to 1 if the home country is required to follow IFRS or US GAAP, and 0 otherwise

**Table II.**
Summary statistics

**Table III.**
Firm characteristics and earnings response of Canadian firm

*Panel A: firm characteristics of treatment and placebo sample*

| Standardized firm characteristics | Treatment sample | Placebo sample | Two-sample *t*-test (treatment – placebo) |
|---|---|---|---|
| Analyst coverage | 1.165 | 1.117 | 0.048 (1.07) |
| B/M ratio | 0.020 | 0.015 | 0.005 (0.11) |
| ERC | −0.107 | −0.126 | 0.019 (0.42) |
| Market cap | 1.247 | 1.168 | 0.079 (1.64) |
| Leverage | 0.018 | 0.011 | 0.007 (0.20) |

*Panel B: earnings response of Canadian firms before and after cross-listings in the USA*

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Treatment sample | | | | Placebo sample | |
| Dependent variable | Abnormal return | | Abnormal volume | | Abnormal return | Abnormal volume |
| SUR | 0.212 (0.59) | 0.477*** (3.36) | 0.187** (2.25) | 0.250 (0.76) | 0.209** (2.12) | 0.086 (1.05) |
| DIS | −0.021* (−1.84) | 0.043 (0.19) | −0.039 (−1.51) | 0.155*** (3.01) | 0.026 (0.48) | 0.197*** (2.51) |
| NUM | 0.727** (2.08) | −0.144** (−2.35) | 0.529*** (6.51) | −0.376*** (−2.65) | −0.236* (−1.89) | −0.175* (1.80) |
| CL | | −0.759*** (−2.85) | | −0.071 (−1.16) | −0.198 (−0.34) | −0.021 (−0.06) |
| CL×SUR | | −0.048*** (−3.34) | | −0.023 (−0.70) | 0.027 (0.80) | −0.039 (−1.22) |
| CL×DIS | | −0.062 (−0.28) | | −0.160*** (−3.09) | 0.051 (0.72) | −0.067 (−0.50) |
| CL×NUM | | 0.152** (2.48) | | 0.043*** (3.02) | 0.009 (0.06) | 0.002 (0.21) |
| Intercept | 0.117 (0.55) | 0.764*** (2.88) | 0.178*** (36.05) | 0.250*** (4.06) | 0.062* (1.68) | 0.216*** (10.14) |
| Industry FE | YES | YES | YES | YES | YES | YES |
| Cluster (Firm) | YES | YES | YES | YES | YES | YES |
| Observations | 53,676 | 53,676 | 53,680 | 53,680 | 57,212 | 57,217 |

**Notes:** Panel A of this table presents the summary statistics of the treatment sample as well as the matched sample. The two-sample *t*-test tests the null hypothesis that the population means related to two samples are equal. All variables are standardized to a mean of 0 and a standard deviation of 1. Panel B of this table examines the earnings response of Canadian firms before and after cross-listings in the USA. The dependent variables, abnormal return or abnormal trading volume, is regressed on earnings surprises (SUR), dispersion of estimation (DIS), number of estimates (NUM), cross-listing dummy (CL) and the relevant interaction terms with the cross-listing dummy. The explanatory variables are constructed according to Table II. The cross-listing dummy (CL) is a dummy equal to 1 after the initial cross-listing date and 0 for the time before cross-listing. The intercept and fixed effects (Industry FE) are present in each regression, but their estimates are not shown. The calculated standard errors in parentheses are clustered by individual firm. The table also reports the number of observations and the adjusted $R^2$. *,**,***Significant at 10, 5 and 1 percent levels, respectively

where the *BM*, *MC*, *Lev*, *AC* and *ERC* denote the standardized B/M ratio, market capitalization, leverage, analyst coverage and ERC, respectively. Lastly, we match each cross-listed firm with a non-cross-listed firm with the closest Euclidean distance. We allow matching with replacement.

Panel A of Table III presents the summary statistics of the two samples. The standardized analyst coverage and market capitalization of the Canadian firms in the treatment group are both above 0. Similar to Bae *et al.* (2006), this suggests that the cross-listed firms are generally larger and more visible firms. Our matched sample exhibits similar characteristics[3]. Notably, the ERC, the main variable of interest in this study, also behaves similarly between these two samples before cross-listing events. In summary, the difference between the control and the matched sample is mostly insignificant, confirming the comparability of these two samples.

Panel B of Table III presents the panel regression results. The dependent variables, AR or abnormal trading volume, is regressed on earnings surprises (SUR), dispersion of estimation (DIS), number of estimates (NUM), cross-listing dummy (CL) and the relevant interaction terms with the cross-listing dummy. The cross-listing dummy (CL) is a dummy equal to 1 after the initial cross-listing date and 0 for the time before cross-listing. The intercept and industry-fixed effects (Industry FE) are present in each regression, but their estimates are not shown. The calculated standard errors in parentheses are clustered by individual firm.

The main results from Table III are summarized as below. First, the ERCs, i.e. the coefficients of earnings surprises (SUR), appears to be insignificant in specification (1), but become significantly negative after including the cross-listing dummy and its interaction terms. The main coefficients of interest are the interaction terms – CL×SUR in specification (2) and CL×DIS in specification (4). The results confirm the hypothesis of our "seeing" channel that after cross-listing, the ERCs of foreign firms decrease. The decrease is also economically significant: a reduction of 0.048 from 0.477, which is more than a 10 percent decrease. Similar results can be observed for the abnormal trading volume. The response of abnormal trading volume to analysts' dispersion drops significantly after listing in the USA. In fact, the coefficient of dispersion decreases by 0.160 from 0.155 – which suggests that cross-listing events almost completely ease the impact of analysts' dispersion on abnormal trading volume. This is again consistent with our hypothesis of our "seeing" mechanism that the earnings response of abnormal volume is reduced upon cross-listing in the USA. In comparison to the treatment group, the placebo tests find no observable changes in the ERCs as expected. As a control variable, the number of estimates (NUM) is largely negatively related to AR, suggesting more visibility could result in smaller stock price fluctuations. Taken together, these results validate the causal effect of visibility on the ERCs.

Second, the estimation results of AR differ notably from the abnormal trading volume. Our results suggest that the AR become less sensitive in response to earnings surprise, while the abnormal trading volume turns unresponsive to analysts' dispersion. However, there is little change in AR in response to analysts' dispersion and abnormal volume in reaction to earnings surprise. We interpret these results as follows: noticeably, the analysts' dispersion measures the disagreement among investors, rather than the accuracy of the estimates. Suppose the analysts' estimates are overall accurate (the mean of estimates is unbiased) but dispersed; when the uncertainty of earnings is resolved, investors with incorrect beliefs need to rebalance their portfolios by excessive trading activities. Yet, since the mean estimate of analysts is overall unbiased, the abnormal return of the stock would be minimal. In this case, analysts' dispersion is closely related to abnormal trading volume but not to AR.

*Earnings response of Level I and Rule 144a listings before and after cross-listing*

We further evaluate the effects of the credibility channel ("believing"). We conduct similar regressions as in Table III with a sample split, namely, Level II and III ADRs vs the Level I

or Rule 144a registration. Since the sample we use in this section contains firms from multiple markets, we include the firm age and two country-level control variables – legal system and accounting standard as defined previously. These three variables are believed to be related to the ERCs in the previous literature (Kwon *et al.*, 2007). Table IV presents our results.

We highlight the major findings in Table IV. The estimated coefficients of CL×SUR and CL×DIS are positive in specification (1) and (3), respectively. But the estimates are negative and statistically significant in specification (2) and (4). As per our findings, firms listed under Level II and III ADR program exhibit an increased earnings response following cross-listing, while the firms listed under Level I or Rule 144a registration shows a decreased earnings response. While surprising at first glance, this is consistent with the predictions of our credibility channel ("believing"). The intuition is that a cross-listing under Level II and III ADR program, which must fulfill the GAAP standards, activates the credibility channel ("believing"). Meanwhile, the Level I or Rule 144a registration, which has no GAAP

| | Abnormal return | | Abnormal trading volume | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | Level II and III | Level I and Rule 144a | Level II and III | Level I and Rule 144a |
| *Panel A: full sample* | | | | |
| SUR | 0.154 (0.56) | 0.431*** (2.82) | 0.035 (0.63) | 0.011 (1.26) |
| DIS | 0.039 (0.12) | −0.051 (−0.11) | 0.021 (0.36) | 0.309*** (3.48) |
| NUM | 0.085 (0.58) | −0.559*** (−3.06) | 0.027 (0.91) | −0.047 (−1.26) |
| CL | 0.589 (0.65) | −1.898*** (−3.76) | 0.247 (1.60) | −0.063 (−0.61) |
| CL×SUR | 0.154* (1.70) | −0.417*** (−2.82) | 0.034 (−0.78) | −0.020 (−0.58) |
| CL×DIS | −0.021 (−0.07) | 0.106 (0.01) | 0.024* (1.86) | −0.311*** (−3.58) |
| CL×NUM | −0.069 (−0.53) | 0.606*** (3.68) | 0.073 (0.88) | 0.058 (1.37) |
| Intercept | YES | YES | YES | YES |
| Industry FE | YES | YES | YES | YES |
| Controls | YES | YES | YES | YES |
| Cluster (Firm) | YES | YES | YES | YES |
| Observation | 55,851 | 78,340 | 55,851 | 78,340 |
| *Panel B: Firms with low quality of accounting standard (below median)* | | | | |
| SUR | 0.203 (0.51) | 0.483*** (2.78) | 0.096 (0.95) | 0.004 (0.55) |
| DIS | 0.128 (0.33) | −0.004 (−0.06) | 0.114 (0.34) | 0.343*** (3.39) |
| NUM | 0.089 (0.54) | −0.519*** (−3.45) | 0.062 (0.84) | −0.009 (−1.02) |
| CL | 0.545 (0.62) | −1.869*** (−3.10) | 0.296 (1.54) | −0.050 (−0.61) |
| CL×SUR | 0.184** (1.99) | −0.472*** (−2.86) | 0.064 (-0.73) | 0.069 (−0.53) |
| CL×DIS | 0.029 (0.08) | 0.179 (0.02) | 0.086** (2.14) | −0.395*** (−3.64) |
| CL×NUM | −0.077 (−0.18) | 0.672*** (3.61) | 0.022 (0.67) | 0.088 (1.31) |
| Intercept | YES | YES | YES | YES |
| Industry FE | YES | YES | YES | YES |
| Controls | YES | YES | YES | YES |
| Cluster (Firm) | YES | YES | YES | YES |
| Observation | 21,233 | 23,502 | 21,233 | 23,502 |

**Notes:** This table examines the earnings response of foreign firms before and after cross-listings in the USA. The dependent variables, abnormal return, is regressed on earnings surprises (SUR), dispersion of estimation (DIS), number of estimates (NUM), cross-listing dummy (CL) and the relevant interaction terms with the cross-listing dummy. The cross-listing dummy (CL) is a dummy equal to 1 after the initial cross-listing date and 0 for the time before cross-listing. The intercept and industry-fixed effects are present in each regression, but their estimates are not shown. The controls include firm age, accounting standards and legal system. The calculated standard errors in parentheses are clustered by individual firm. The table also reports the number of observations and the adjusted $R^2$ The sample consists of the firms with low quality of accounting standard (below median). *,**,***Significant at 10, 5 and 1 percent levels, respectively

**Table IV.**
Earnings response of foreign firms before and after cross-listings

compliance requirements, renders the credibility channel ineffective. These results highlight the positive impact of the credibility channel ("believing") in determining the earnings response, consistent with our hypothesis in Lemma 2.

One possible concern is that some non-US firms having reliable disclosures might simply register as Rule 144a or Level I ADRs for convenience. To further validate our test of the credibility hypothesis, we conduct the following exercise. First, we split our sample by the quality of the accounting standards at the median[4]. In this way, we can separate the firms with unreliable disclosures from those with credible disclosures but simply looking for convenience. We re-run our estimation using only the firms with low accounting standards. Panel B of Table IV shows the estimation results. After removing the firms with reliable disclosures but who may be simply looking for convenience, the estimated coefficients of CL×SUR and CL×DIS become greater in Panel B in absolute terms and are more statistically significant. These results suggest that the credibility hypothesis is more pronounced for firms starting with poor accounting standards and later choosing to list as Level II and III ADRs.

**Endogenous cross-listing decision**

Another potential concern is that the decision to list in a foreign market is endogenous. The sample of observed gains could potentially be biased upward. For example, a firm might choose to list its shares abroad only if the gain in visibility or credibility is more likely to outweigh the costs. To correct for this self-selection bias, we employ the Hackman selection model, following Choi *et al.* (2009). In the first stage, we run a probit model to predict the probability of cross-listing. We create a panel containing annual observations of all possible combinations of a firm, the host country, and year. We assign a cross-listing indicator for each possible combination of a firm, the host country and year. The cross-listing indicator, $I_{i,j,t}$, equals 1 if cross-listing exists for firm $i$ in country $j$ at time $t$, and 0 otherwise. Based on the gravity theory in Sarkissian and Schill (2016), we include a set of macroeconomic variables (e.g. export/import between country pairs), proximity measures (e.g. geographic distance), aggregated market conditions (e.g. past performance) and firm-level controls (e.g. share of income from foreign sources) as our explanatory variables. These variables are known to be closely related to cross-listing decisions. In the second step, we correct the self-selection bias by including the inverse mills ratio from the first step as an additional control variable in our main regression.

We report the results of the probit regression of the first step in panel A of Table V. Our results confirm the characteristics that are related to a firm's cross-listing decision: Positive past return, larger market capitalization, close economic and geographic proximity lead to higher probability of a firm listing its shares in a foreign market.

Once we obtain the inverse mills ratio from the probit regressions, we re-run our main results in Tables III and IV with inverse mills ratio as an additional independent variable. The results are reported in panels B and C of Table V. Panel B presents the earnings response of Canadian firms before and after cross-listings. The coefficient of the inverse mills ratio in Panel B of Table V is not significant, suggesting the endogenous cross-listing decision does not pose a serious concern in this exercise. Our main coefficients of interest, CL×SUR for AR and CL×DIS for abnormal volume remain significantly negative. This further confirms the impact of "visibility" on earnings response. Panel C of Table V reproduces the results in panel A of Table IV after correcting for possible sample bias. Similarly, the coefficients of the inverse mills ratio in panel C of Table V are not significant. Most of the results are similar to the ones in Table IV. Taken together, after addressing the concern of self-selection bias using the Hackman selection model, our empirical tests of the "visibility" and "credibility" channels remain valid.

**Conclusion**

In this paper, our key contribution is the reconciliation of the two mechanisms of information asymmetry with respect to the information environment for the first time. We disentangle two

*Panel A: step 1 – probit regression*

| | |
|---|---|
| Lagged GDP (Log) | 2.456*** (43.23) |
| GDP Growth | 0.178*** (7.64) |
| Export to USA (Log) | −0.812*** (−42.24) |
| Import from USA (Log) | 0.363*** (14.45) |
| Geographic proximity (Log) | 0.187*** (−6.64) |
| Culture Proximity | −1.355*** (−25.32) |
| US Market Return | 0.0001 (0.004) |
| Host Market Return | 0.276*** (6.124) |
| Firm Return | −0.156*** (−10.32) |
| Firm Size | 0.257*** (45.43) |
| Firm Foreign Income | 0.032*** (3.09) |
| B/M Ratio | 0.130*** (4.32) |
| Intercept | Yes |
| Industry FE | Yes |
| Observations | 57,772 |
| Pseudo $R^2$ | 0.31 |

*Panel B: earnings response of Canadian firms before and after cross-listings*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Canadian firms | | | |
| Dependent variable | Abnormal return | | Abnormal volume | |
| SUR | 0.223 (0.65) | 0.462*** (3.41) | 0.154** (1.99) | 0.191 (0.33) |
| DIS | −0.015* (−1.78) | 0.010 (0.07) | −0.028 (−1.40) | 0.147*** (2.74) |
| NUM | 0.574* (1.88) | −0.178** (−2.42) | 0.465*** (2.87) | −0.401** (−2.32) |
| CL | | −0.213* (−1.81) | | −0.055 (−0.85) |
| CL×SUR | | −0.059*** (−3.97) | | −0.023 (−0.70) |
| CL×DIS | | −0.056 (−0.35) | | −0.153*** (−2.86) |
| CL×NUM | | 0.131** (2.20) | | 0.058*** (3.20) |
| Inverse Mills Ratio | 0.023 (1.26) | 0.066 (1.42) | 0.048 (1.03) | 0.079 (1.57) |
| Industry FE | Yes | Yes | Yes | Yes |
| SE Clustering (Firm) | Yes | Yes | Yes | Yes |
| Observations | 53,676 | 53,676 | 53,680 | 53,680 |

*Panel C: earnings response of foreign firms before and after cross-listings*

| | Abnormal return | | Abnormal trading volume | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | Level II and III ADRs | Level I and Rule 144a | Level II and III ADRs | Level I and Rule 144a |
| SUR | 0.168 (0.53) | 0.467*** (2.78) | 0.086 (0.60) | 0.007 (0.54) |
| DIS | 0.045 (0.11) | −0.011 (−0.09) | 0.024 (0.31) | 0.348*** (3.40) |
| NUM | 0.161 (0.50) | −0.499*** (−3.45) | 0.084 (0.86) | −0.023 (−1.26) |
| CL | 0.126 (0.58) | −0.187 (−1.11) | 0.286 (1.51) | −0.003 (−0.26) |
| CL×SUR | 0.156* (1.75) | −0.302*** (−2.76) | 0.070 (−0.72) | −0.002 (−0.52) |
| CL×DIS | −0.039 (−0.03) | 0.162 (0.04) | 0.023* (1.72) | −0.276*** (−3.69) |
| CL×NUM | −0.072 (−0.52) | 0.637*** (3.60) | 0.023 (0.30) | 0.014 (1.30) |
| Inverse Mills Ratio | 0.045 (0.60) | 0.089 (0.95) | 0.059 (0.31) | 0.028 (1.10) |
| Industry FE | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Cluster (Firm) | Yes | Yes | Yes | Yes |
| Observation | 55,851 | 78,340 | 55,851 | 78,340 |

**Notes:** Panel B examines the earnings response of Canadian firms before and after cross-listings in the USA. The dependent variables, abnormal return or abnormal trading volume, is regressed on earnings surprises (SUR), dispersion of estimation (DIS), number of estimates (NUM), cross-listing dummy (CL) and the relevant interaction terms with the cross-listing dummy. Inverse Mills Ratio is from Panel A of Table V. The explanatory variables are constructed according to Table II. The cross-listing dummy (CL) is a dummy equal to 1 after the initial cross-listing date and 0 for the time before cross-listing. The intercept and industry-fixed effects (Industry FE) are present in each regression, but their estimates are not shown. The calculated standard errors in parentheses are clustered by individual firm. The table also reports the number of observations and the adjusted $R^2$. The controls include firm age, accounting standards and legal system. *,**,***Significant at 10, 5 and 1 percent levels, respectively

**Table V.**
Robustness checks: endogenous cross-listing decision

mechanisms of information asymmetry ("seeing" and/or "believing") empirically. Returning to the question in our title and our introduction with respect to assessing these two mechanisms of information asymmetry ("seeing" or "believing"), our results indicate both mechanisms of information asymmetry can take effect simultaneously. The effective channel(s) depends on which listing program a firm chooses to pursue. Thus, this study sheds light on the multi-dimensional impact of the improved information environment that non-US firms face when they list their securities on US exchanges.

## Notes

1. Brown and Warner (1985) examine properties of daily stock returns and how the particular characteristics of these data affect event study methodologies. They show that daily data present few difficulties for event studies and standard procedures are typically well-specified even when special daily data characteristics are ignored.
2. The earnings response coefficient (ERC) is the coefficient of regressing unexpected stock return on unexpected earnings.
3. One caveat is that the size of cross-listed firms is slightly larger than the matched firms though statistical insignificant. This is because in Canada, many of the largest firms are also dual-listed in the USA. However, we manage to close the gap between these two samples as much as possible.
4. The accounting standards index is an indicator of the reliability of the accounting standards in each country. It is produced by the Center for International Financial Analysis and Research and has been used by La Porta *et al.* (1998) and Bailey *et al.* (2006). In our sample, Sweden enjoys the highest accounting standards index (83), while Venezuela and Peru have the lowest score (38). The average AS index is about 61 (e.g. Italy). Next, we split the sample firms by the AS index at the median.

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## Further reading

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